Mesenteric Doppler Blood Flow Velocities in Pre-Operative Infants with Transposition of the Great Arteries

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BACKGROUND: Decreased mesenteric perfusion in newborn infants with congenital heart disease (CHD) is associated with an increased risk of developing major gastrointestinal (GI) complications including necrotizing enterocolitis (NEC). The development NEC increases morbidity and delays definitive surgical intervention. There are no data describing mesenteric blood flow velocity patterns and GI complications in pre-operative infants with transposition of the great arteries (TGA).

OBJECTIVE: To describe mesenteric blood flow velocity (BFV) patterns in a population of pre-operative term infants with TGA. To compare BFV in infants with TGA with control infants and to examine for associated GI complications in TGA.

DESIGN/METHODS: Doppler blood flow velocities were measured from both the superior mesenteric (SMA) and celiac (CA) arteries following initial 2D vessel visualization. Average velocity (AV) and pulsatility index (PI) were calculated from the Doppler waveform for each vessel.

RESULTS: Data were obtained from 13 infants with TGA (mean (SD) birth weight 3448 ±309 g, mean gestation 39.6 ±0.8 weeks). Median age at study was 2 days (IQR 2, 6.7). Control data were obtained from 8 stable term infants. The PI was significantly increased in the SMA and CA in infants with TGA. There was a non-significant trend to decreased AV in TGA infants.

Mesenteric Doppler Blood Flow Velocities			
	TGA (n=13)	**Control** (n=8)	
SMA - AV (cm/sec)	23.0 (20.0, 40.7)	30.0 (27.9, 37.7)	NS
CA - AV (cm/sec)	38.0 (32.7, 49.5)	44.5 (31.5, 60.3)	NS
SMA - PI	2.39 (1.95, 3.01)	1.80 (1.56, 2.1)	p=0.03
CA-PI	1.87 (1.72, 2.54)	1.35 (1.1, 1.57)	p=0.01

Data presented as Median (Interquartile ranges)

Blood flow was continuously antegrade in all controls. In TGA infants end-diastolic flow was reversed or absent in 11/13 SMA and 4/13 CA studies. Three infants with TGA developed GI complications which included 2 cases of NEC.

CONCLUSIONS: We have demonstrated significant abnormalities in mesenteric blood flow velocity in this group of infants with TGA. GI complications occurred in 3/13 infants with 2 cases of NEC. Improved understanding of the mesenteric perfusion abnormalities in pre-operative TGA may enable the development of clinical management strategies that avoid interventions which further compromise intestinal blood flow and potentially increase GI complication rates in these infants.